

PATENT
540-012.3

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the matter of: Martti)
Serial No:) Group Art Unit
Filed: Herewith) Examiner:
For: Method and Apparatus for)
Panoramic Dental X-Raying)

ASSISTANT COMMISSIONER OF PATENTS
WASHINGTON, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Please preliminarily amend the above-referenced application as follows:

In the Specification:

Please remove all headers.

On page 1, prior to line 4, please insert a new heading as follows:

--Technical Field--.

On page 1, prior to line 11, please insert a new heading as follows:

--Background of the Invention--.

5 Express Mail No. EL628641513US

Please replace paragraph beginning at page 1, line 11, with the following rewritten paragraph:

--Panoramic X-raying aims at forming images of the teeth in a projection that is as orthogonal, i.e. perpendicular as possible, thus avoiding having the teeth imaged in an overlapping manner. Since the dental arch differs in shape from a circular arch, the axis of rotation of the arm must be shifted in course of the imaging in order to achieve the purpose of orthogonal imaging. The radius of curvature of the dental arch being smallest in the front area of the arch, it is preferred to approach the axis of rotation to the teeth when this area is imaged in order to minimise the need for shifting the axis. During X-raying of the molar teeth, the distance between the axis and the spot of the teeth to be imaged is typically longer.--

On page 2, prior to line 1, please insert a new heading as follows:

--Summary of the Invention--.

Please replace paragraph beginning at page 3, line 22, with the following rewritten paragraph:

--Since, in the practice, it is desirable to X-ray the dental arch with one single continuous rotational movement, the X-ray beam is limited in accordance with the invention as the movement reaches the front area of the dental arch, and after this the beam is accordingly enlarged to its original width as it leaves this area. It is thus preferable to connect the adjustment of the shutter with the movement performed during the imaging, for

instance by narrowing and widening the shutter aperture through which the X-ray beam passes under mechanical control of the movement of the axis of rotation of the arm.

Retardation and subsequent acceleration of the movement of the X-ray beam would take place in tandem with the gradual narrowing and widening of the shutter to ensure a

5 substantially constant exposure of the arch to X-rays through the entire length of the arch.--

Please replace paragraph beginning at page 3, line 34, with the following rewritten paragraph:

--The apparatus of the invention for panoramic dental X-raying, which comprises an arm rotating about an axis, a radiation source at one end of the arm for emitting an X-ray beam, a shutter shaping the X-ray beam, and a recorder placed at the opposite end of the arm to receive the X-ray beam after it has passed through the dental arch for forming an image of the dental arch, is characterised by the shutter comprising an aperture through which the X-ray beam passes and which is disposed to decrease in width during the rotational movement of the arm and to subsequently resume its original width. The adjustment of this aperture is preferably performed under mechanical control by the arm rotating mechanism--.

On page 4, prior to line 6, please insert a new heading as follows:

--Brief Description of the Drawings--

In the Claims:

Please remove all headers.

1. (Amended) A panoramic dental X-raying method, comprising emitting an X-ray beam (12) from a radiation source (9) provided in a rotating arm (7), guiding said beam through the dental arch (1) to a recorder (11) disposed opposite the radiation source in the arm in order to form an image, rotating the arm so as to form an image of substantially the entire width of the dental arch, limiting the X-ray beam (12) by a shutter (13) in the front area of the dental arch (1) as compared to the two sides of the arch, in order to increase in said front area the thickness of the layer (4) of which a sharp image is formed, and retarding the movement of the X-ray beam (12) in said front area of the dental arch (1) compared to the two sides of the arch.

In the Abstract:

Please remove all headers.

Please replace paragraph beginning at page 10, line 1, with the following rewritten paragraph:

--Abstract of the Disclosure

A method and an apparatus for panoramic dental X-raying comprises an arm (7) rotating about an axis (6), a radiation source (9) at one end (8) of the arm for generating an

X-ray beam (12), a shutter (13) for shaping the X-ray beam, and at the opposite end (10) of the arm, a recorder (11) for receiving the X-ray beam after it has passed through the dental arch for forming an image of the dental arch. The X-raying is performed with rotation of the arm (7) so as to image substantially the entire length of the dental arch. The shutter (13) narrows the X-ray beam (12) in the front area of the dental arch in order to increase the thickness of the sharply imaged layer compared to the two sides of the dental arch.--

Remarks

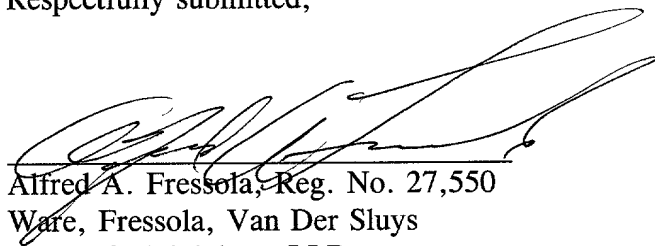
This preliminary amendment is filed for the purpose of placing the application into standard U.S. format and to correct any grammatical errors. Claim 1 has been amended to correct a grammatical error.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

Consideration and allowance of the claims is earnestly solicited.

Respectfully submitted,

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Version with Markings to Show Changes Made

In the Specification:

Paragraph beginning at page 1, line 11, has been amended as follows:

Panoramic X-raying aims at forming images of the teeth in a projection that is as orthogonal, i.e. perpendicular as possible, thus avoiding [that] having the teeth [are] imaged in an overlapping manner. Since the dental arch differs in shape from a circular arch, the axis of rotation of the arm must be shifted in course of the imaging in order to achieve the purpose of orthogonal imaging. The radius of curvature of the dental arch being smallest in the front area of the arch, it is preferred to approach the axis of rotation to the teeth when this area is imaged in order to minimise the need for shifting the axis. During X-raying of the molar teeth, the distance between the axis and the spot of the teeth to be imaged is typically longer.

Paragraph beginning at page 3, line 22 has been amended as follows:

Since, in the practice, it is desirable to X-ray the dental arch with one single continuous rotational movement, the X-ray beam is limited in accordance with the invention as the movement reaches the front area of the dental arch, and after this the beam is accordingly enlarged to its original width as it leaves this area. It is thus preferable to connect the adjustment of the shutter with the movement performed during the imaging, for instance by narrowing and widening the shutter aperture through which the X-ray beam passes under mechanical control of the movement of the axis of [ration] rotation of the arm.

Retardation and subsequent acceleration of the movement of the X-ray beam would take place in tandem with the gradual narrowing and widening of the shutter to ensure a substantially constant exposure of the arch to X-rays through the entire [lenght] length of the arch.

5 Paragraph beginning at page 3, line 34 has been amended as follows:

10 The apparatus of the invention for panoramic dental X-raying, which comprises an arm rotating about an axis, a radiation source at one end of the arm for emitting an X-ray beam, a shutter shaping the X-ray beam, and a recorder placed at the opposite end of the arm to receive the X-ray beam after it has passed through the dental arch for forming an image of the dental arch, is characterised by the shutter comprising [a] an aperture through which the X-ray beam passes and which is disposed to decrease in width during the rotational movement of the arm and to subsequently resume [it] its original width. The adjustment of this aperture is preferably performed under mechanical control by the arm rotating mechanism.

15 In the Claims:

1 1. (Amended) A panoramic dental X-raying method, comprising emitting an X-
2 ray beam (12) from a radiation source (9) provided in a rotating arm (7), [quiding] guiding
3 said beam through the dental arch (1) to a recorder (11) disposed opposite the radiation
4 source in the arm in order to form an image, rotating the arm so as to form an image of

substantially the entire width of the dental arch, limiting the X-ray beam (12) by a shutter (13) in the front area of the dental arch (1) as compared to the two sides of the arch, in order to increase in said front area the thickness of the layer (4) of which a sharp image is formed, and retarding the movement of the X-ray beam (12) in said front area of the dental arch (1) compared to the two sides of the arch.

In the Abstract:

Paragraph beginning at page 10, line 1 has been amended as follows:

Abstract of the Disclosure

[The invention relates to a] A method and an apparatus for panoramic dental X-raying[. The apparatus] comprises an arm (7) rotating about an axis (6), a radiation source (9) at one end (8) of the arm for generating an X-ray beam (12), a shutter (13) for shaping the X-ray beam, and at the opposite end (10) of the arm, a recorder (11) for receiving the X-ray beam after it has passed through the dental arch for forming an image of the dental arch. The X-raying is performed with rotation of the arm (7) so as to image substantially the entire length of the dental arch. [According to the invention, the] The shutter (13) narrows the X-ray beam (12) in the front area of the dental arch in order to increase the thickness of the sharply imaged layer compared to the two sides of the dental arch. [This solution allows compensation for the decrease in the width of the sharp layer caused by the orthogonal X-raying and for the consequently shortened X-raying radius in the front area of the dental arch. The sharp layer having increased thickness enhances the probability of successful

images and the visibility of the dental structure in the pictures. The shutter (13) may have a narrow aperture through which the X-ray beam (12) passes and which decreases and increases in width under the mechanical control of the rotation of the arm.]